



## CLAIMS

What is claimed is:

1. A compound comprising a metal complexed with a chelating group attached to a gastrin releasing peptide (GRP) receptor agonist which includes a bombesin agonist binding moiety.
- 5 2. The compound according to claim 1, wherein said compound has a structure of the formula X-Y-B wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.
- 10 3. The compound of claim 2 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof.
4. The compound of claim 2 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.
- 15 5. The compound of claim 4 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).
6. The compound of claim 4 wherein X is DOTA or a derivative thereof.
7. The compound of claim 6 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).
- 20 8. The compound of claim 7 wherein Y is a combination of L-glutamine and a hydrocarbon chain.
9. The compound of claim 8 wherein Y is a combination of L-glutamine and a C1 to C10 hydrocarbon chain.
- 25 10. The compound of claim 9 wherein Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminooctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).
- 30 11. The compound of claim 4 wherein X is N3S or a derivative thereof.
12. The compound of claim 11 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).
13. The compound of claim 12 wherein Y is gly-ser-gly.
- 35 14. A complex comprising a metal and a compound having a structure of the formula X-Y-B wherein X is a metal chelating group, Y is a spacer group or covalent bond

and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

15. The complex of claim 14 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

16. The complex of claim 14 wherein the metal is selected from the group consisting of: 105Rh-, 99mTc-, 186/188Re-, 153Sm-, 166Ho-, 111In-, 90Y-, 177Lu-, 149Pm-, 166Dy-, 175Yb-, 199Au- and 117mSn-.

17. The complex of claim 16 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

18. The complex of claim 17 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

19. The complex of claim 16 wherein X is DOTA or a derivative thereof.

20. The complex of claim 19 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

21. The complex of claim 20 wherein Y is a combination of L-glutamine and a hydrocarbon chain.

22. The complex of claim 21 wherein Y is a combination of L-glutamine and a C1 to C10 hydrocarbon chain.

23. The complex of claim 22 wherein Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutyric acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminoctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

24. The complex of claim 23 wherein Y is 8-aminoctanoic acid.

25. The complex of claim 23 consisting of 90Y-DOTA-8-Aoc-BBN(7-14)NH2.

26. The complex of claim 23 consisting of 111In-DOTA-8-Aoc-BBN(7-14)NH2.

27. The complex of claim 23 consisting of 177Lu-DOTA-8-Aoc-BBN(7-14) NH2.

28. The complex of claim 23 consisting of 149Pm-DOTA-8-Aoc-BBN(7-14) NH2.

29. The complex of claim 23 consisting of 90Y-DOTA-5-Ava-BBN(7-14)NH2.

30. The complex of claim 23 consisting of  $^{111}\text{In}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.

31. The complex of claim 23 consisting of  $^{177}\text{Lu}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.

5 32. The complex of claim 23 consisting of  $^{149}\text{Pm}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.

33. The complex of claim 16 wherein X is N<sub>3</sub>S or a derivative thereof.

34. The complex of claim 33 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

10 35. The complex of claim 34 wherein Y is gly-ser-gly.

36. The complex of claim 34 consisting of  $^{99\text{m}}\text{Tc}$ -N<sub>3</sub>S-gly-ser-gly-BBN(7-14)NH<sub>2</sub>.

37. A method of treating patient using radioisotope therapy by 15 administering an effective amount of a pharmaceutical comprising a metal complex with a chelating group with a gastrin releasing peptide receptor agonist which includes a bombesin agonist moiety.

38. The method according to claim 37, wherein said method includes administering an effective amount of a complex comprising a metal and a compound having a 20 structure of the formula

X-Y-B

wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

25 39. The method of claim 38 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

40. The method of claim 38 wherein the metal is selected from the group consisting of:  $^{105}\text{Rh}$ -,  $^{99\text{m}}\text{Tc}$ -,  $^{186/188}\text{Re}$ -,  $^{153}\text{Sm}$ -,  $^{166}\text{Ho}$ -,  $^{111}\text{In}$ -,  $^{90}\text{Y}$ -,  $^{177}\text{Lu}$ -,  $^{149}\text{Pm}$ -, 30  $^{166}\text{Dy}$ -,  $^{175}\text{Yb}$ -,  $^{199}\text{Au}$  and  $^{117}\text{mSn}$ .

41. The method of claim 40 wherein X is selected from the group consisting of DOTA, DTPA, S<sub>4</sub>, N<sub>3</sub>S, N<sub>2</sub>S<sub>2</sub>, NS<sub>3</sub> and derivatives thereof.

42. The method of claim 41 wherein X is DOTA or a derivative thereof.

43. The method of claim 42 wherein Y is selected from the group 35 consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

44. The method of claim 43 wherein Y is a combination of L-glutamine and a hydrocarbon chain.

45. The method of claim 44 wherein Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminoctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

46. A method of imaging a patient by administering to a subject a diagnostically effective amount of a compound as set forth in claim 1.

47. The method of claim 46, wherein said method includes administering an effective amount of a complex comprising a metal and a compound having a structure of the formula

X-Y-B

wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

48. The method of claim 47 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

49. The method of claim 48 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

50. The method of claim 49 wherein X is N3S or a derivative thereof.

51. The method of claim 50 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

52. The method of claim 51 wherein Y is gly-ser-gly.

53. A method of forming a therapeutic or diagnostic compound comprising the step of reacting a metal complexed with a chelating group with a gastrin releasing peptide receptor agonist which includes a bombesin agonist moiety.

54. The method of claim 53, wherein said method includes reacting a metal with a compound having a structure of the formula

X-Y-B

wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

55. The method of claim 54 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

56. The method of claim 54 wherein the metal is selected from the group 5 consisting of:  $^{99m}\text{Tc}$ - and  $^{186/188}\text{Re}$ -.

57. The method of claim 56 wherein Y is selected is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof.

58. The method of claim 57 wherein X is selected from the group 10 consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

59. The method of claim 58 wherein B is selected from the group consisting of BBN(7-14) and BBN(8-14).

60. The method of claim 59 wherein X is DOTA or a derivative thereof and Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutyric acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminoctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

61. The method of claim 59 wherein X is N3S or a derivative thereof and Y is gly-ser-gly.

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